

Geotechnical Investigation



- **Primary Investigation**
 - October-December 2007
- **Additional Pier 2 Boring**
 - January 2008
- **Borings**
 - 9 for bridge foundations
 - 3 for walls
 - 8 for roadway
- **HQ and NQ Core**



Geotechnical Investigation

- **Materials Encountered**

- **Overburden Soils**

- Ranged from about 20 to 30 feet deep in abutment borings
 - Approx. 27 to 28 ft thick at Pier 2
 - Approx. 9 to 12 ft thick at Pier 3, under 7 to 8 ft of water
 - Shallow overburden predominantly sand and silt, some clay
 - Some borings encountered gravel deposits overlying bedrock

- **Bedrock**

- Sandstone, siltstone, conglomerate, claystone, mudstone
 - Rock strength and quality highly variable across bridge site



Variation of Bedrock

Abut 4 (Boring 8) Core from 61 to 82'

Depth (ft)	Percent Recovery	Percent RQD
63.5-68.5	100	86
68.5-73.5	90	68
73.5-78.5	72	16
78.5-83.5	106	60



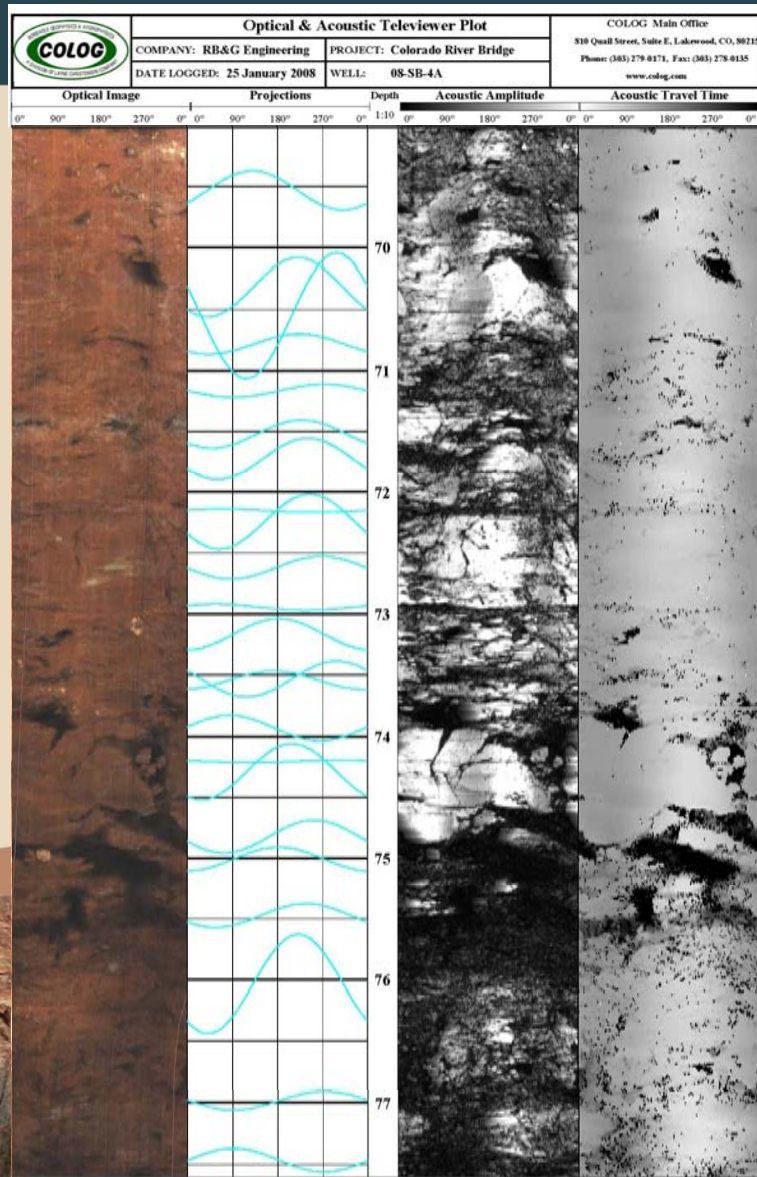
Variation of Bedrock

Pier 2 (Boring 4A) Core from 52 to 77'

Depth (ft)	Percent Recovery	Percent RQD
53.5-58.5	94	56
58.5-63.1	46	11
63.1-66.0	76	0
66.0-68.5	76	16
68.5-71.0	64	16
71.0-73.5	56	0
73.5-76.0	48	0



Variation of Bedrock



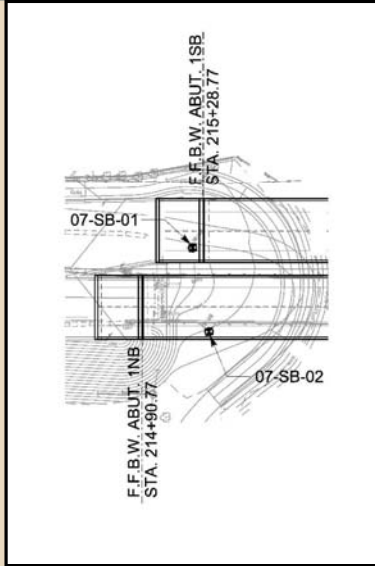
Water Levels



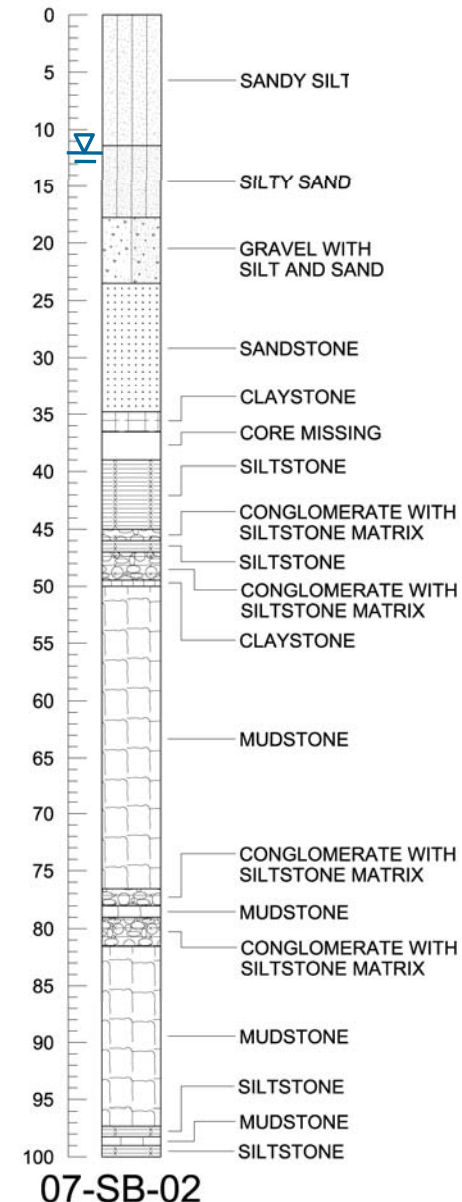
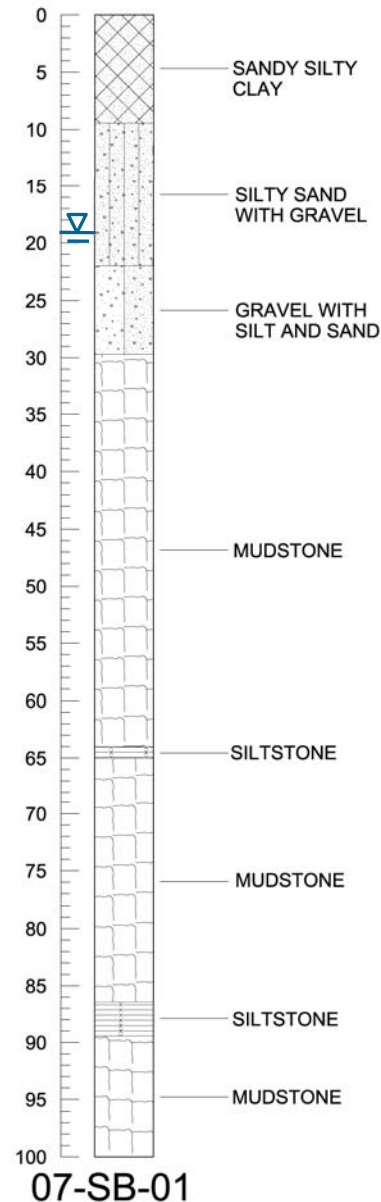
- **Nov. 2007 River Elev.**
 - 3955 ft
- **Nov. 2007 – Jan. 2008 Groundwater Elev.**
 - 3954 to 3958 ft at foundation locations
- **Groundwater levels will vary depending on season and river level**



Subsurface – Abutment 1



Mudstone, Siltstone



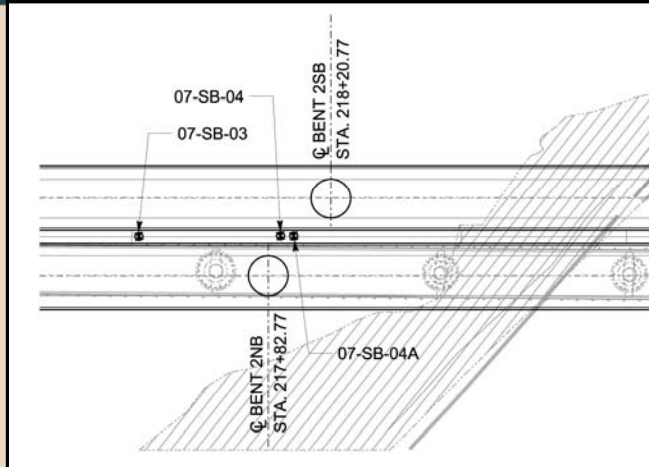
Subsurface – Abutment 1

BORINGS 1 & 2 - UNIAXIAL COMPRESSIVE STRENGTHS (PSI)

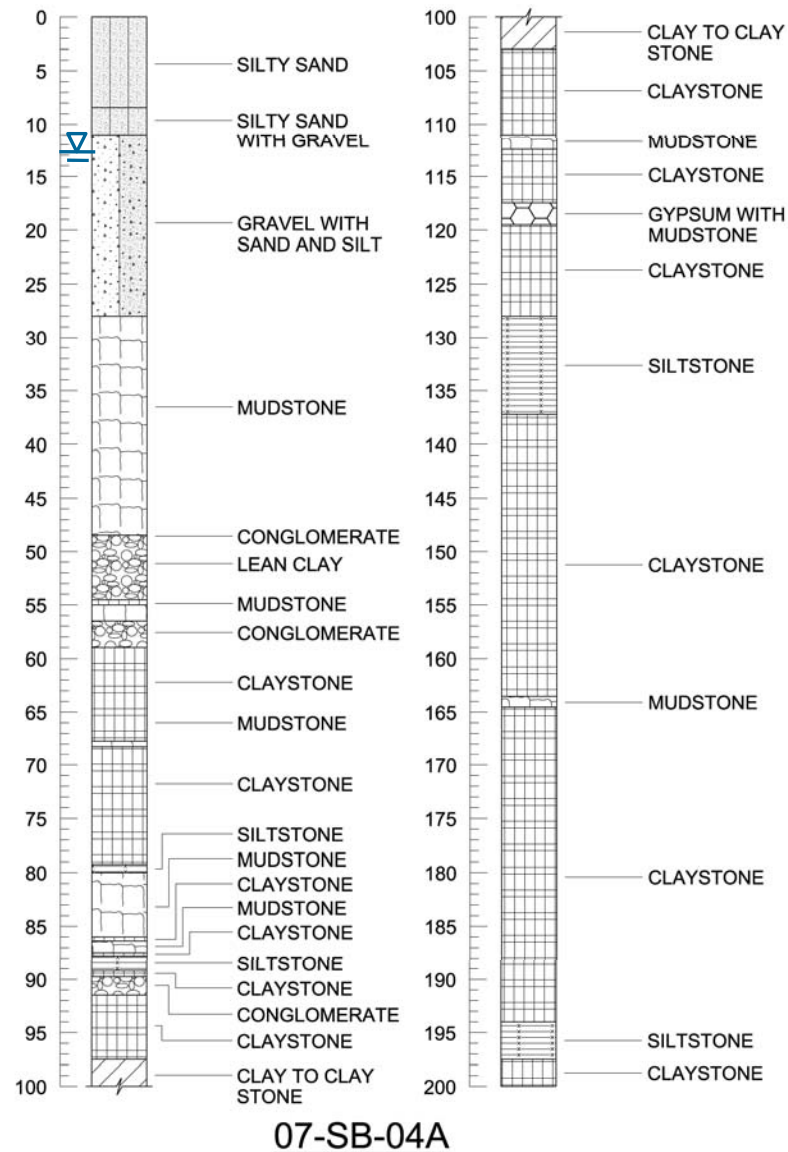
Material	Mudstone/Claystone	Conglomerate	Sandstone	Siltstone
Tests	10	2	2	1
Maximum	5500	8810	4770	1980
Minimum	90	7540	2460	
Average	1740			
Median	1650			
Approximate Percentage Encountered	60 to 95%	0 to 10%	0 to 15%	0 to 10%



Subsurface – Pier 2



Mudstone, Siltstone



FIGG

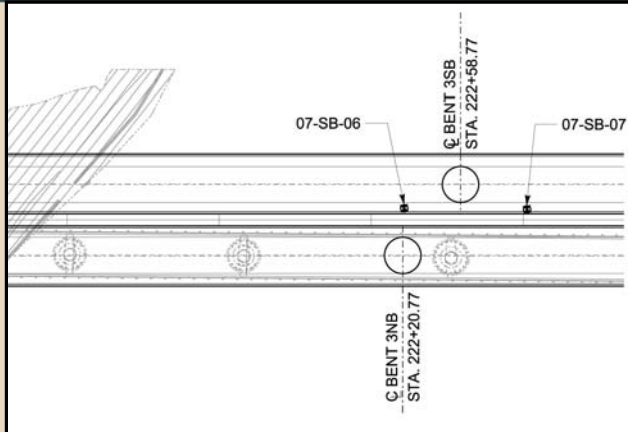
Subsurface – Pier 2

BORINGS 4 & 4A - UNIAXIAL COMPRESSIVE STRENGTHS (PSI)

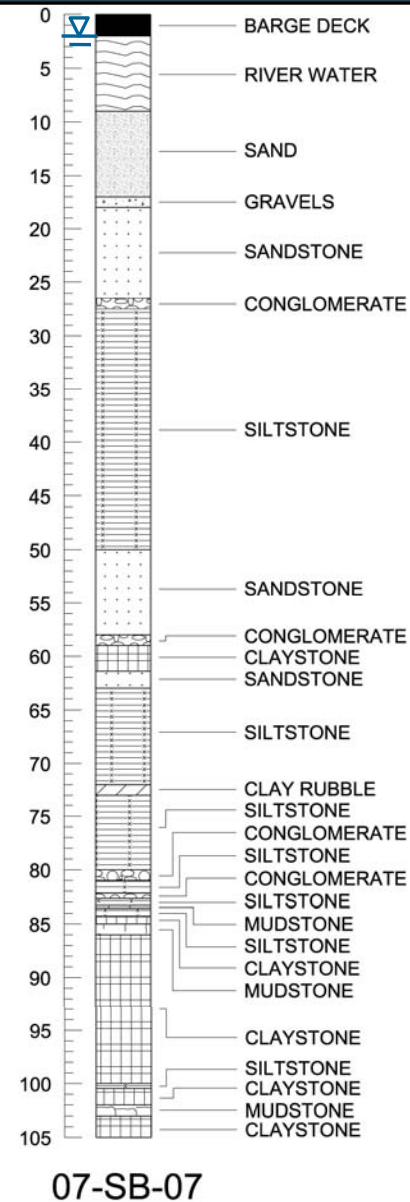
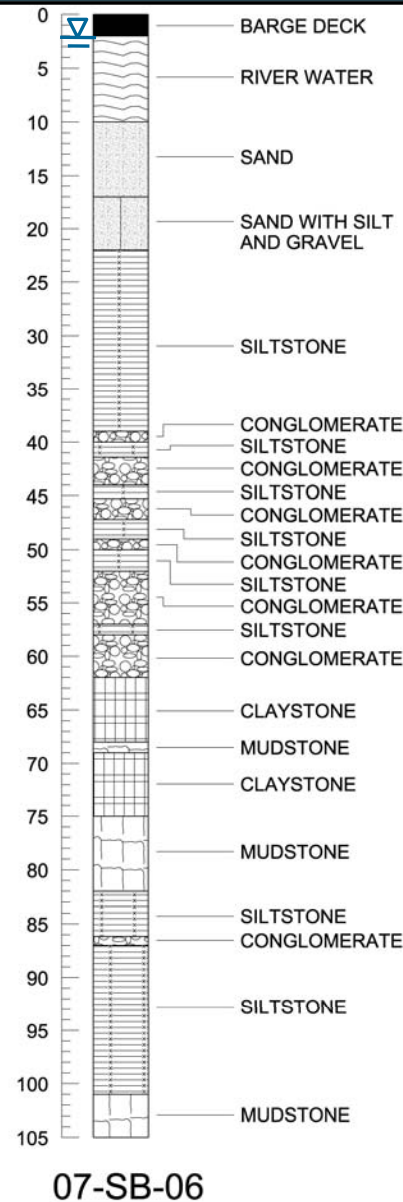
Material	Mudstone/Claystone	Conglomerate	Sandstone	Siltstone
Tests	15	4		
Maximum	3170	4113		
Minimum	30	573		
Average	552	1920		
Median	169	1500		
Approximate Percentage Encountered	85%	5%	0%	10%



Subsurface – Pier 3



Claystone, Mudstone, Siltstone,
Sandstone



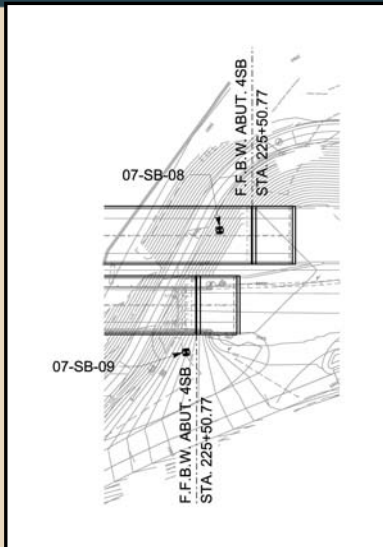
Subsurface – Pier 3

BORINGS 6 & 7 - UNIAXIAL COMPRESSIVE STRENGTHS (PSI)

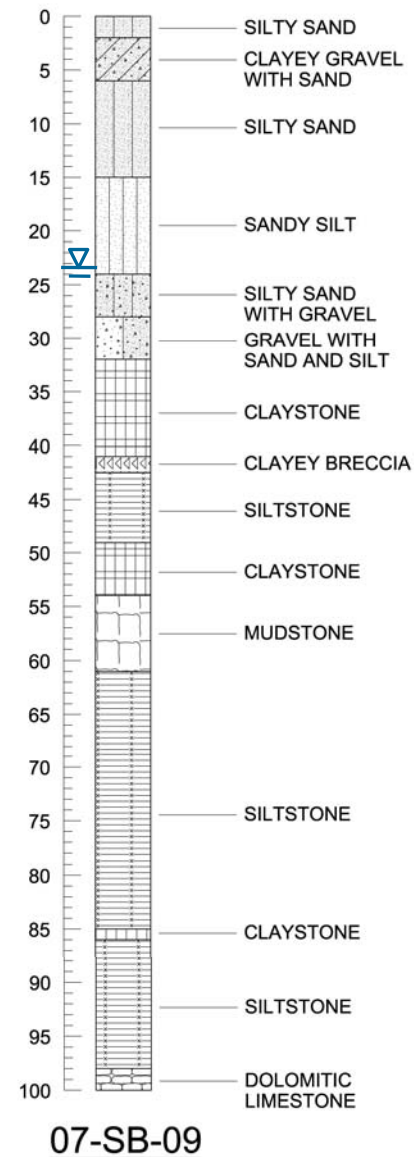
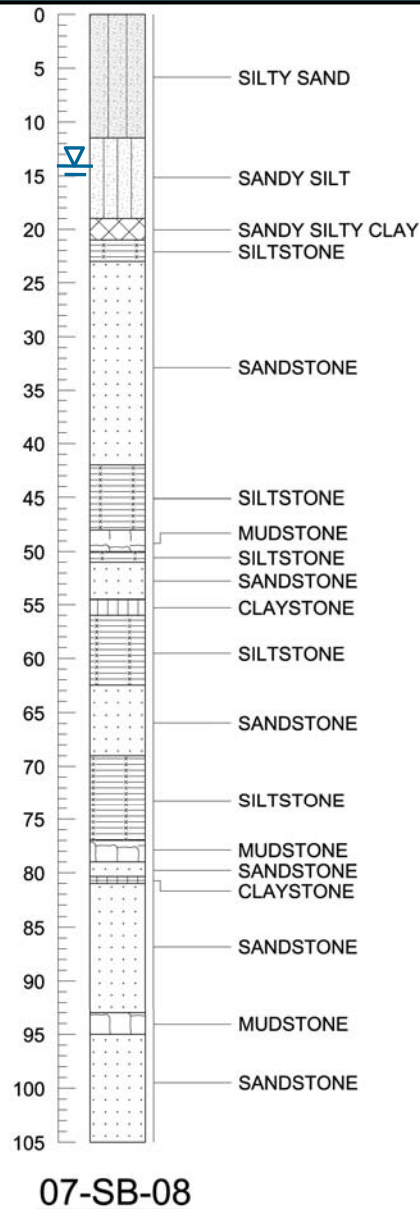
Material	Mudstone/Claystone	Conglomerate	Sandstone	Siltstone
Tests	4		3	12
Maximum	870		11210	10940
Minimum	180		2200	900
Average	415		7360	7405
Median	305		8680	7715
Approximate Percentage Encountered	30 to 35%	5 to 20%	0 to 20%	40 to 50%



Subsurface – Abutment 4



Claystone, Mudstone,
Siltstone, Sandstone



FIGG

Subsurface – Abutment 4

BORINGS 8 & 9 - UNIAXIAL COMPRESSIVE STRENGTHS (PSI)

Material	Mudstone/Claystone	Conglomerate	Sandstone	Siltstone
Tests	3		6	7
Maximum	4280		8930	10390
Minimum	780		5360	2950
Average	2690		6985	6710
Median	3022		6815	6830
Approximate Percentage Encountered	10 to 35%	0%	0 to 60%	30 to 65%



Drilled Shafts

- **Water Level, Fluctuation**
- **Cofferdams**
- **Dewatering / Tremie Placement**
- **Casing through overburden**
 - May be temporary or permanent for shafts at piers
 - Must be removed at the abutments
- **Cross-hole Sonic Logging**

